

# Lymph System

The lymph system is most familiar to people because doctors and mothers often check for "swollen lymph nodes" in the neck. It turns out that the lymph nodes are just one part of a system that extends throughout your body in much the same way your blood vessels do. The main difference between the blood flowing in the circulatory system and the lymph flowing in the lymph system is that blood is pressurized by the heart, while the lymph system is passive. There is no "lymph pump" like there is a "blood pump" (the [heart](#)). Instead, fluids ooze into the lymph system and get pushed by normal body and muscle motion to the lymph nodes. This is very much like the water and sewer systems in a community. Water is actively pressurized, while sewage is passive and flows by gravity.

Lymph is a clearish liquid that bathes the cells with water and nutrients. Lymph is blood plasma -- the liquid that makes up blood minus the red and white cells. Think about it -- each cell does not have its own private blood vessel feeding it, yet it has to get food, water, and oxygen to survive. Blood transfers these materials to the lymph through the capillary walls, and lymph carries it to the [cells](#). The cells also produce proteins and waste products and the lymph absorbs these products and carries them away. Any random bacteria that enter the body also find their way into this inter-cell fluid. One job of the lymph system is to drain and filter these fluids to detect and remove the bacteria. Small lymph vessels collect the liquid and move it toward larger vessels so that the fluid finally arrives at the lymph nodes for processing.

Lymph nodes contain filtering tissue and a large number of lymph cells. When fighting certain bacterial infections, the lymph nodes swell with bacteria and the cells fighting the bacteria, to the point where you can actually feel them. Swollen lymph nodes are therefore a good indication that you have an infection of some sort.

Once lymph has been filtered through the lymph nodes it re-enters the bloodstream.

## Thymus

The thymus lives in your chest, between your breast bone and your heart. It is responsible for producing T-cells (see the next section), and is especially important in newborn babies - without a thymus a baby's immune system collapses and the baby will die. The thymus seems to be much less important in adults - for example, you can remove it and an adult will live because other parts of the immune system can handle the load. However, the thymus is important, especially to T cell maturation (as we will see in the section on white blood cells below).

## Spleen

The spleen filters the blood looking for foreign cells (the spleen is also looking for old red blood cells in need of replacement). A person missing their spleen gets sick much more often than someone with a spleen.

## Bone marrow

Bone marrow produces new blood cells, both red and white. In the case of red blood cells the cells are fully formed in the marrow and then enter the bloodstream. In the case of some white blood cells, the cells mature elsewhere. The marrow produces all blood cells from **stem cells**. They are called "stem cells" because they can branch off and become many different types of cells - they are precursors to different cell types. Stem cells change into actual, specific types of white blood cells.

## White blood cells

White blood cells are described in detail in the next section.